1. Multiply the following functions, then choose the domain of the resulting function from the list below.

$$f(x) = 6x^2 + x + 6 \text{ and } g(x) = \sqrt{4x + 25}$$

A. The domain is all Real numbers except $x = a$, where $a \in [2.4, 11.4]$

B. The domain is all Real numbers greater than or equal to $x = a$, where $a \in [-9.25, -4.25]$

C. The domain is all Real numbers less than or equal to $x = a$, where $a \in [-2.5, 10.5]$

D. The domain is all Real numbers except $x = a$ and $x = b$, where $a \in [5.67, 11.67]$ and $b \in [-7.83, -0.83]$

E. The domain is all Real numbers.

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2. Choose the interval below that f composed with g at $x = 1$ is in.

$$f(x) = 3x^3 + 2x^2 - x - 4 \text{ and } g(x) = 2x^3 - 4x^2 + 2x + 2$$

A. $(f \circ g)(1) \in [34, 39]$

B. $(f \circ g)(1) \in [2, 4]$

C. $(f \circ g)(1) \in [8, 18]$

D. $(f \circ g)(1) \in [21, 31]$

E. It is not possible to compose the two functions.

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3. Choose the interval below that f composed with g at $x = 1$ is in.

$$f(x) = 2x^3 + 3x^2 - 2x \text{ and } g(x) = -3x^3 - 3x^2 + 4x$$

A. $(f \circ g)(1) \in [1, 11]$

B. $(f \circ g)(1) \in [-109, -103]$

C. $(f \circ g)(1) \in [-1, 1]$

D. $(f \circ g)(1) \in [-102, -90]$

E. It is not possible to compose the two functions.

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4. Find the inverse of the function below. Then, evaluate the inverse at $x = 6$ and choose the interval that $f^-1(6)$ belongs to.

$$f(x) = \ln(x + 4) + 4$$

A. $f^{-1}(6) \in [1.39, 5.39]$

B. $f^{-1}(6) \in [22019.47, 22024.47]$

C. $f^{-1}(6) \in [9.39, 14.39]$

D. $f^{-1}(6) \in [22029.47, 22035.47]$

E. $f^{-1}(6) \in [9.39, 14.39]$

---

5. Find the inverse of the function below (if it exists). Then, evaluate the inverse at $x = 15$ and choose the interval that $f^-1(15)$ belongs to.

$$f(x) = 2x^2 - 3$$

A. $f^{-1}(15) \in [5.93, 6.5]$

B. $f^{-1}(15) \in [2.58, 3.53]$

C. $f^{-1}(15) \in [4.86, 5.77]$

D. $f^{-1}(15) \in [2.06, 2.97]$

E. The function is not invertible for all Real numbers.

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6. Find the inverse of the function below. Then, evaluate the inverse at $x = 8$ and choose the interval that $f^-1(8)$ belongs to.

$$f(x) = e^{x-5} - 2$$

A. $f^{-1}(8) \in [-0.01, 1.1]$

B. $f^{-1}(8) \in [-3.28, -2.68]$

C. $f^{-1}(8) \in [-2.24, -0.83]$

D. $f^{-1}(8) \in [7.11, 8.12]$

E. $f^{-1}(8) \in [-0.33, 0.41]$

---

7. Determine whether the function below is 1-1.

$$f(x) = 36x^2 - 204x + 289$$

A. No, because there is an x-value that goes to 2 different y-values.

B. Yes, the function is 1-1.

C. No, because there is a y-value that goes to 2 different x-values.

D. No, because the range of the function is not $(-\infty, \infty)$.

E. No, because the domain of the function is not $(-\infty, \infty)$.

---

8. Determine whether the function below is 1-1.

$$f(x) = 9x^2 - 21x - 228$$

A. No, because the domain of the function is not $(-\infty, \infty)$.

B. No, because there is a y-value that goes to 2 different x-values.

C. No, because the range of the function is not $(-\infty, \infty)$.

D. Yes, the function is 1-1.

E. No, because there is an x-value that goes to 2 different y-values.

---

9. Add the following functions, then choose the domain of the resulting function from the list below.

$$f(x) = \sqrt{-6x + 22} \text{ and } g(x) = 8x + 3$$

A. The domain is all Real numbers except $x = a$, where $a \in [-4.4, 2.6]$

B. The domain is all Real numbers greater than or equal to $x = a$, where $a \in [4.25, 6.25]$

C. The domain is all Real numbers less than or equal to $x = a$, where $a \in [1.67, 4.67]$

D. The domain is all Real numbers except $x = a$ and $x = b$, where $a \in [-5.83, -0.83]$ and $b \in [4.83, 12.83]$

E. The domain is all Real numbers.

---

10. Find the inverse of the function below (if it exists). Then, evaluate the inverse at $x = 15$ and choose the interval that $f^-1(15)$ belongs to.

$$f(x) = \sqrt[3]{5x - 2}$$

A. $f^{-1}(15) \in [-675.69, -675.24]$

B. $f^{-1}(15) \in [675.16, 675.65]$

C. $f^{-1}(15) \in [673.87, 674.67]$

D. $f^{-1}(15) \in [-675.01, -674.59]$

E. The function is not invertible for all Real numbers.

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11. Multiply the following functions, then choose the domain of the resulting function from the list below.

$$f(x) = 4x^2 + 4x + 4 \text{ and } g(x) = 5x^2 + 8x + 2$$

A. The domain is all Real numbers except $x = a$, where $a \in [-12.67, -3.67]$

B. The domain is all Real numbers greater than or equal to $x = a$, where $a \in [0.25, 6.25]$

C. The domain is all Real numbers less than or equal to $x = a$, where $a \in [-5.4, 0.6]$

D. The domain is all Real numbers except $x = a$ and $x = b$, where $a \in [3.67, 9.67]$ and $b \in [-4.33, 0.67]$

E. The domain is all Real numbers.

---

12. Choose the interval below that f composed with g at $x = 1$ is in.

$$f(x) = -x^3 - 2x^2 + x \text{ and } g(x) = -4x^3 - 4x^2 + 4x + 3$$

A. $(f \circ g)(1) \in [-3.2, 0.5]$

B. $(f \circ g)(1) \in [9.5, 11.2]$

C. $(f \circ g)(1) \in [4.5, 8]$

D. $(f \circ g)(1) \in [2.6, 4.9]$

E. It is not possible to compose the two functions.

---

13. Choose the interval below that f composed with g at $x = 1$ is in.

$$f(x) = -3x^3 + 4x^2 + 4x \text{ and } g(x) = x^3 - 1x^2 - 3x + 1$$

A. $(f \circ g)(1) \in [81, 89]$

B. $(f \circ g)(1) \in [28, 36]$

C. $(f \circ g)(1) \in [35, 42]$

D. $(f \circ g)(1) \in [88, 96]$

E. It is not possible to compose the two functions.

---

14. Find the inverse of the function below. Then, evaluate the inverse at $x = 7$ and choose the interval that $f^-1(7)$ belongs to.

$$f(x) = e^{x-2} - 2$$

A. $f^{-1}(7) \in [-1.06, 0.03]$

B. $f^{-1}(7) \in [-0.08, 0.39]$

C. $f^{-1}(7) \in [-1.06, 0.03]$

D. $f^{-1}(7) \in [-0.08, 0.39]$

E. $f^{-1}(7) \in [3.32, 4.75]$

---

15. Find the inverse of the function below (if it exists). Then, evaluate the inverse at $x = -12$ and choose the interval that $f^-1(-12)$ belongs to.

$$f(x) = \sqrt[3]{2x - 5}$$

A. $f^{-1}(-12) \in [-863.5, -860.5]$

B. $f^{-1}(-12) \in [-866.5, -865.5]$

C. $f^{-1}(-12) \in [866.5, 870.5]$

D. $f^{-1}(-12) \in [855.5, 862.5]$

E. The function is not invertible for all Real numbers.

---

16. Find the inverse of the function below. Then, evaluate the inverse at $x = 9$ and choose the interval that $f^-1(9)$ belongs to.

$$f(x) = e^{x-5} + 2$$

A. $f^{-1}(9) \in [6.88, 7.09]$

B. $f^{-1}(9) \in [-3.15, -2.83]$

C. $f^{-1}(9) \in [4.54, 4.85]$

D. $f^{-1}(9) \in [4.28, 4.42]$

E. $f^{-1}(9) \in [3.38, 3.42]$

---

17. Determine whether the function below is 1-1.

$$f(x) = 25x^2 - 90x - 319$$

A. No, because the range of the function is not $(-\infty, \infty)$.

B. No, because the domain of the function is not $(-\infty, \infty)$.

C. No, because there is a y-value that goes to 2 different x-values.

D. No, because there is an x-value that goes to 2 different y-values.

E. Yes, the function is 1-1.

18. Determine whether the function below is 1-1.

$$f(x) = 9x^2 - 60x + 100$$

A. No, because there is a y-value that goes to 2 different x-values.

B. No, because the range of the function is not $(-\infty, \infty)$.

C. No, because the domain of the function is not $(-\infty, \infty)$.

D. Yes, the function is 1-1.

E. No, because there is an x-value that goes to 2 different y-values.

19. Subtract the following functions, then choose the domain of the resulting function from the list below.

$$f(x) = \frac{5}{3x - 20} \text{ and } g(x) = 7x + 3$$

A. The domain is all Real numbers greater than or equal to $x = a$, where $a \in [-7.4, 3.6]$

B. The domain is all Real numbers less than or equal to $x = a$, where $a \in [2, 4]$

C. The domain is all Real numbers except $x = a$, where $a \in [5.67, 7.67]$

D. The domain is all Real numbers except $x = a$ and $x = b$, where $a \in [-0.33, 8.67]$ and $b \in [2.83, 11.83]$

E. The domain is all Real numbers.

20. Find the inverse of the function below (if it exists). Then, evaluate the inverse at $x = 14$ and choose the interval that $f^-1(14)$ belongs to.

$$f(x) = 5x^2 - 4$$

A. $f^{-1}(14) \in [2.69, 3.04]$

B. $f^{-1}(14) \in [5.7, 5.94]$

C. $f^{-1}(14) \in [0.88, 1.83]$

D. $f^{-1}(14) \in [1.81, 2.14]$

E. The function is not invertible for all Real numbers.

---

21. Subtract the following functions, then choose the domain of the resulting function from the list below.

$$f(x) = 4x^3 + x^2 + 5x + 3 \text{ and } g(x) = \frac{4}{6x + 19}$$

A. The domain is all Real numbers except $x = a$, where $a \in [-3.17, 2.83]$

B. The domain is all Real numbers less than or equal to $x = a$, where $a \in [-10.2, -0.2]$

C. The domain is all Real numbers greater than or equal to $x = a$, where $a \in [-13.5, -6.5]$

D. The domain is all Real numbers except $x = a$ and $x = b$, where $a \in [-6.6, -5.6]$ and $b \in [-7.33, -3.33]$

E. The domain is all Real numbers.

---

22. Choose the interval below that f composed with g at $x = -1$ is in.

$$f(x) = 2x^3 - 3x^2 - 4x - 1 \text{ and } g(x) = 3x^3 - 1x^2 - 3x + 3$$

A. $(f \circ g)(-1) \in [-9, -3]$

B. $(f \circ g)(-1) \in [0, 4]$

C. $(f \circ g)(-1) \in [-21, -12]$

D. $(f \circ g)(-1) \in [-29, -26]$

E. It is not possible to compose the two functions.

---

23. Choose the interval below that f composed with g at $x = 1$ is in.

$$f(x) = 4x^3 - 1x^2 - 2x \text{ and } g(x) = x^3 + x^2 - x + 2$$

A. $(f \circ g)(1) \in [88, 97]$

B. $(f \circ g)(1) \in [-5, -4]$

C. $(f \circ g)(1) \in [2, 6]$

D. $(f \circ g)(1) \in [100, 103]$

E. It is not possible to compose the two functions.

---

24. Find the inverse of the function below. Then, evaluate the inverse at $x = 8$ and choose the interval that $f^-1(8)$ belongs to.

$$f(x) = e^{x-4} - 4$$

A. $f^{-1}(8) \in [-4.61, -1.61]$

B. $f^{-1}(8) \in [-1.52, -0.52]$

C. $f^{-1}(8) \in [1.48, 11.48]$

D. $f^{-1}(8) \in [-4.61, -1.61]$

E. $f^{-1}(8) \in [-1.52, -0.52]$

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25. Find the inverse of the function below (if it exists). Then, evaluate the inverse at $x = -13$ and choose the interval that $f^-1(-13)$ belongs to.

$$f(x) = 4x^2 - 3$$

A. $f^{-1}(-13) \in [2.52, 3.29]$

B. $f^{-1}(-13) \in [3.81, 4.71]$

C. $f^{-1}(-13) \in [1.81, 2.5]$

D. $f^{-1}(-13) \in [1.15, 1.95]$

E. The function is not invertible for all Real numbers.

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26. Find the inverse of the function below. Then, evaluate the inverse at $x = 9$ and choose the interval that $f^-1(9)$ belongs to.

$$f(x) = e^{x+5} - 2$$

A. $f^{-1}(9) \in [-0.77, -0.59]$

B. $f^{-1}(9) \in [7.29, 7.8]$

C. $f^{-1}(9) \in [0.07, 0.74]$

D. $f^{-1}(9) \in [-0.08, 0.22]$

E. $f^{-1}(9) \in [-2.69, -2.51]$

---

27. Determine whether the function below is 1-1.

$$f(x) = 9x^2 - 60x + 100$$

A. Yes, the function is 1-1.

B. No, because the range of the function is not $(-\infty, \infty)$.

C. No, because the domain of the function is not $(-\infty, \infty)$.

D. No, because there is an x-value that goes to 2 different y-values.

E. No, because there is a y-value that goes to 2 different x-values.

---

28. Determine whether the function below is 1-1.

$$f(x) = (3x - 18)^3$$

A. No, because there is an x-value that goes to 2 different y-values.

B. Yes, the function is 1-1.

C. No, because there is a y-value that goes to 2 different x-values.

D. No, because the range of the function is not $(-\infty, \infty)$.

E. No, because the domain of the function is not $(-\infty, \infty)$.

---

29. Multiply the following functions, then choose the domain of the resulting function from the list below.

$$f(x) = \frac{2}{3x - 13} \text{ and } g(x) = \frac{2}{3x - 19}$$

A. The domain is all Real numbers less than or equal to $x = a$, where $a \in [-4.17, -2.17]$

B. The domain is all Real numbers except $x = a$, where $a \in [-8.8, -1.8]$

C. The domain is all Real numbers greater than or equal to $x = a$, where $a \in [3.33, 10.33]$

D. The domain is all Real numbers except $x = a$ and $x = b$, where $a \in [2.33, 8.33]$ and $b \in [4.33, 10.33]$

E. The domain is all Real numbers.

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30. Find the inverse of the function below (if it exists). Then, evaluate the inverse at $x = -12$ and choose the interval that $f^-1(-12)$ belongs to.

$$f(x) = 4x^2 - 3$$

A. $f^{-1}(-12) \in [1.56, 2.12]$

B. $f^{-1}(-12) \in [4.48, 4.58]$

C. $f^{-1}(-12) \in [7.34, 7.65]$

D. $f^{-1}(-12) \in [1.37, 1.68]$

E. The function is not invertible for all Real numbers.
